



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,247	08/26/2003	Hajime Yamamoto	031029	1773

38834 7590 06/12/2009
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
----------	--------------

1795

MAIL DATE	DELIVERY MODE
-----------	---------------

06/12/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/647,247

Applicant(s)

YAMAMOTO ET AL.

Examiner

DABORAH CHACKO DAVIS

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-11 and 14-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-11 and 14-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3, 5-6, 8-11, 14-15, and 18-19, are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1152036 (Kanda et al., hereinafter referred to as Kanda) in view of U. S. Patent No. 3,912,450 (Boucher).

Kanda, in the abstract, in [0001], [0022], [0023], [0024], [0025], [0026], [0034], [0035], and in Table I, discloses forming a semiconductor device by forming a resist pattern on the substrate, coating the resist pattern with a resin composition (resist pattern smoothing material) and subjecting the coated resist pattern to a heat treatment, wherein the thickness of the resin coated onto the resist pattern and the heat treatment is adjusted (suitably determined), followed by developing the coating layer (smoothing layer) resulting in the smoothed resist pattern (resist pattern with smooth side walls, wall surfaces etc). Kanda, in [0024], lines 57-58, and on page 5, lines 1, discloses that the water-soluble resin-coated resist pattern is exposed and developed and heated to at least 85°C, i.e., it will inherently cause the resist walls to smooth forming a smooth resist pattern. Kanda, in [0032], discloses that the resist layer forms a resist opening (hole in positive resist) that corresponds to the exposure performed (claims 1, and 20). Kanda in [0031], [0032], [0033], [0034], [0035], [0036], [0037], and in Table 1, discloses that

the resist patterns formed are without fish eyes or striations at all, i.e., the average opening dimension is greater than 90% of the predetermined opening dimension, and Table I (indicating the characteristics) of Kanda reveals that the maximum and minimum opening dimensions (resist openings that are smoothed, without striations and are uniform) are within a range of $\pm 3\%$ of the predetermined opening dimension. Kanda, in [0023], discloses that the resist is an ArF resist (claims 3, 5, and 6). Kanda, in [0023], discloses that the coating layer is heated in the claimed range (80 - 100°C) (claim 8). Kanda, in [0006], and [0007], discloses that the water-soluble resin composition (coating layer) includes a resin, a surface-active agent, and a crosslinking agent, and is water-soluble (claims 10-11). Kanda, in [0016], discloses that the surfactant is a non-ionic surfactant such as an alkoxylate compound (ethoxylate compound) or alcohols. Kanda, in [0009], and [0011], discloses that the resin is a polyvinyl alcohol, the crosslinking agent is a melamine derivative, and the claimed resin (Claims 14-15). Kanda, in [0019], discloses that the organic solvent is an alcohol solvent (claim 19).

The difference between the claims and Kanda is that Kanda does not disclose the non-ionic surfactant can be polyoxyalkylene alkylether surfactant as recited in the claim 1.

Boucher, in col 5, lines 15-42, discloses the use of the claimed nonionic polyoxyethylene as a nonionic surfactant.

Therefore, it would be obvious to a skilled artisan to modify Kanda by employing the nonionic surfactant suggested by Boucher in the surfactant solution because Kanda, in [0016], discloses that the resist pattern smoothing material comprise a non-ionic

Art Unit: 1795

surfactant, and in [0022], and [0024], discloses that using the water-soluble resin composition that comprises the non-ionic surfactant, enables the coating of the already formed resist pattern and using the coated resist pattern to form a trench pattern of a hole pattern that is fine.

3. Claim 7, is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1152036 (Kanda et al., hereinafter referred to as Kanda) in view of U. S. Patent No. 3,912,450 (Boucher) as applied to claims 1, 3, 5-6, 8-11, 14-15, 18-19, above, and further in view of U. S. Patent No. 6,043,145 (Suzuki et al., hereinafter referred to as Suzuki).

Kanda in view of Boucher is discussed in paragraph no. 2.

The difference between the claim and Kanda in view of Boucher is that Kanda in view of Boucher does not disclose that the smoothed resist pattern has an opening dimension within the range of 50nm to 150nm (claim 7).

Suzuki, in col 4, lines 38-45, discloses that the resist pattern dimensions are increasingly narrowed such that the width (opening dimension of a pattern) of the pattern is 0.15μ (i.e., 150nm).

Therefore, it would be obvious to a skilled artisan to modify Kanda in view of Boucher by employing the opening dimension (width) suggested by Suzuki because Kanda, in [0036], discloses that the resist pattern width (opening of the LSI's) is reduced and smoothed and in [0002], and [0039], discloses that the LSI fabricated in the claimed method would possess reduced spaces (width) in the trenches or holes due to the thickening of the resist.

4. Claims 16-17, are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1152036 (Kanda et al., hereinafter referred to as Kanda) in view of U. S. Patent No. 3,912,450 (Boucher) as applied to claims 1, 3, 5-6, 8-11, 14-15, 18-19, above, and further in view of U. S. Patent No. 6,537,719 (Takahashi) and U. S. Patent No. 6,555,617 (Tanaka et al., hereinafter referred to as Tanaka).

Kanda in view of Boucher is discussed in paragraph no. 2.

The difference between the claims and Kanda in view of Boucher is that Kanda in view of Boucher does not disclose that the resist pattern smoothing material (resin composition) comprises one of a water-soluble aromatic compound and resin having an aromatic compound (claim 16). Kanda in view of Boucher does not disclose the water-soluble aromatic compound recited in claim 17, and does not disclose the resin aromatic compound recited in claim 17.

Takahashi, in col 6, lines 11-42, discloses that the alkali-soluble photosensitive composition (resin) can be aromatic and that the composition includes an aromatic compound such as alcohol derivatives of naphthalene (naphthol).

The difference between the claims and Kanda in view of Boucher further in view of Takahashi is that Kanda in view of Boucher further in view of Takahashi does not disclose the claimed resin containing an aromatic compound.

Tanaka, in col 3, lines 16-64, discloses that the resin composition includes a polyvinyl aryl acetal resin (resin containing an aromatic compound).

Therefore, it would be obvious to modify Kanda in view of Boucher by employing the aromatic compound suggested by Takahashi because Takahashi, in col 4, lines 8-

Art Unit: 1795

16, in col 5, lines 7-20, and in col 6, lines 11-40, and in col 12, lines 40-47, discloses that employing the suggested aromatic phenolic resin is preferable for the formation of a radiation sensitive resin composition so as to enable combination with a fluorescent material without impairing the characteristics of the resist. It would be obvious to a skilled artisan to modify Kanda in view of Boucher further in view of Takahashi by employing the resin containing the aromatic compound because Kanda in [0009], discloses that the resin composition includes a polyvinyl acetal resin, and Tanaka, in col 3, lines 35-56, and in col 5, lines 34-36, and in col 6, lines 38-43, discloses that the resin composition that includes the polyvinyl acetal resin is modified by including an aryl group in the polyvinyl acetal structural unit, and doing so improves the glass transition temperature and heat resistance of the modified coating resin, and that the modified polyvinyl acetal aryl resin is applicable as a coating material due to its adhesiveness and film-forming properties.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Art Unit: 1795

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1, 3, 5-11, 14-19 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-21 of copending Application No. 10/290,493. Although the conflicting claims are not identical, they are not patentably distinct from each other because both claim forming resist pattern with smoothed or reduced edge roughness using the same method steps include applying a smoothing or resist pattern improving material to the resist pattern, heating and developing.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

7. Applicant's arguments, see Amendment and Remarks, filed April 9, 2009, with respect to the rejection(s) of claim(s) 1, 3, 5-6, 8-11, 14-15, and 18-19 under 35 USC 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Boucher (US Patent No. 3,912,450).

A) Applicants argue that Kanda does not disclose the surfactant recited in claim 1.

Kanda teaches the claim 1 limitation as discussed in paragraph no. 2. However, Kanda is not relied upon to disclose the newly claimed surfactant. Boucher is depended

upon to disclose the use of the claimed nonionic surfactant such as polyoxyalkylene alkylether surfactant.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Daborah Chacko-Davis/
Examiner, Art Unit 1795

June 8, 2009.